

## 5 CLAIMS

1. A method for immobilizing a molecule on a support comprising the step of reacting a derivatized molecule with a derivatized support capable of reacting with said derivatized molecule via a cycloaddition reaction.

10 2. The method of claim 1 wherein said cycloaddition reaction is selected from the group consisting of a [1+2]-cycloaddition, [2+2]-cycloaddition, [3+2]-cycloaddition, [2+4]-cycloaddition, [4+6]-cycloaddition, and cheletropic reactions.

15 3. The method of claim 2 wherein said cycloaddition reaction is selected from the group consisting of a 1,3-dipolar cycloaddition, a Diels-Alder reaction, an ene reaction and a [2+2] photochemical cycloaddition reaction.

20

4. The method of claim 1 wherein said molecule is selected from the group consisting of a biomolecule, a macromolecule, and a diagnostic detector molecule (DDM).

25

5. The method of claim 4 wherein said biomolecule is selected from the group consisting of nucleic acids, oligonucleotides, proteins, peptides and amino acids, polysaccharides and saccharides, glycoproteins and glycopeptides, alkaloids, lipids, hormones, drugs, prodrugs, antibodies and metabolites.

30

6. The method of claim 4 wherein said DDM is selected from the group consisting of fluorescent, chemiluminescent, radioisotope and bioluminescent marker compounds; antibodies, biotin and metal chelates.

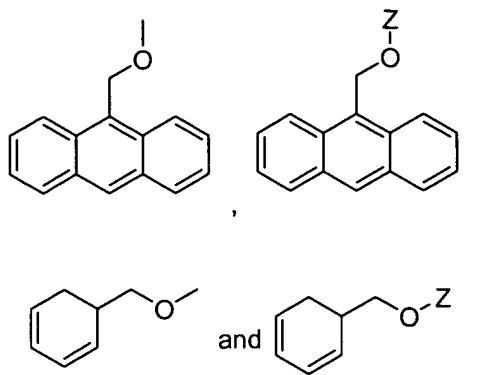
7. The method of claim 6 wherein said DDM is fluorescein.

35

8. The method of claim 1 wherein said molecule is derivatized with a moiety selected from the group consisting of a diene or dienophile, with or without heteroatoms, a 1,3-dipole or 1,3-dipolarophile, with or without heteroatoms, an ene or enophile, with

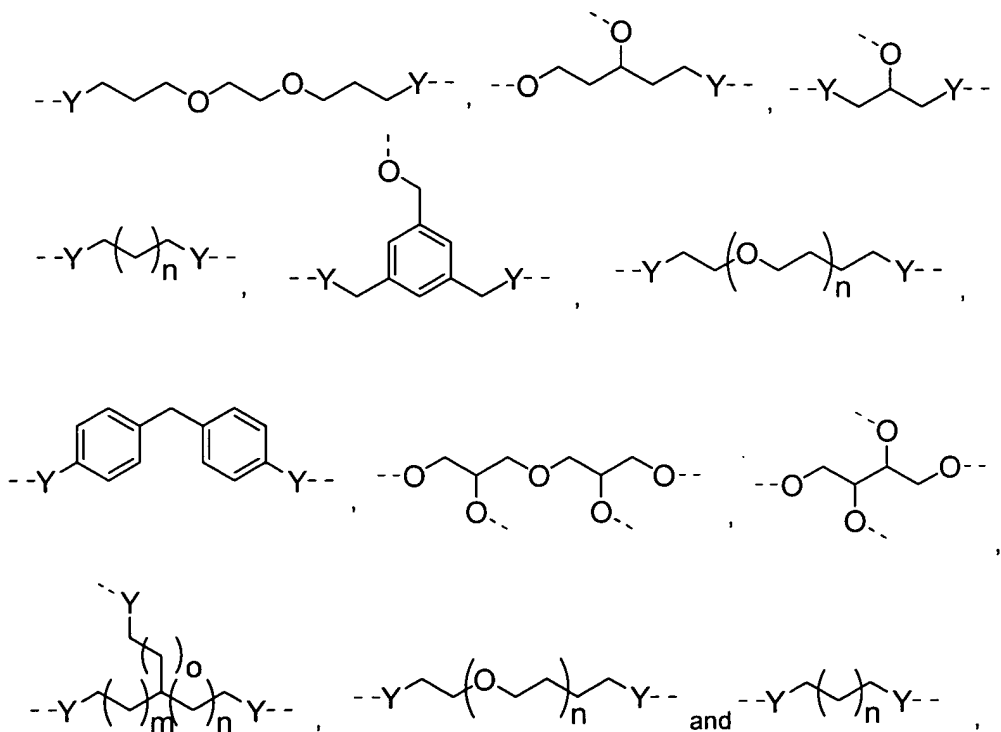
5 or without heteroatoms a C2-C50 alkene, with or without heteroatoms, a C2-C50 alkyne, with or without a heteroatoms, aromatic compounds, carbenes and carbene precursors.

9. The method of claim 8 wherein said diene is selected from the group consisting of:



wherein

Z is a linker selected from the group consisting of:

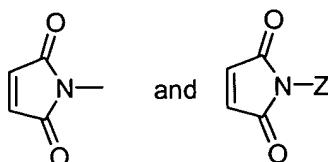


wherein

m, n, o are equal to 0, 1, 2 and

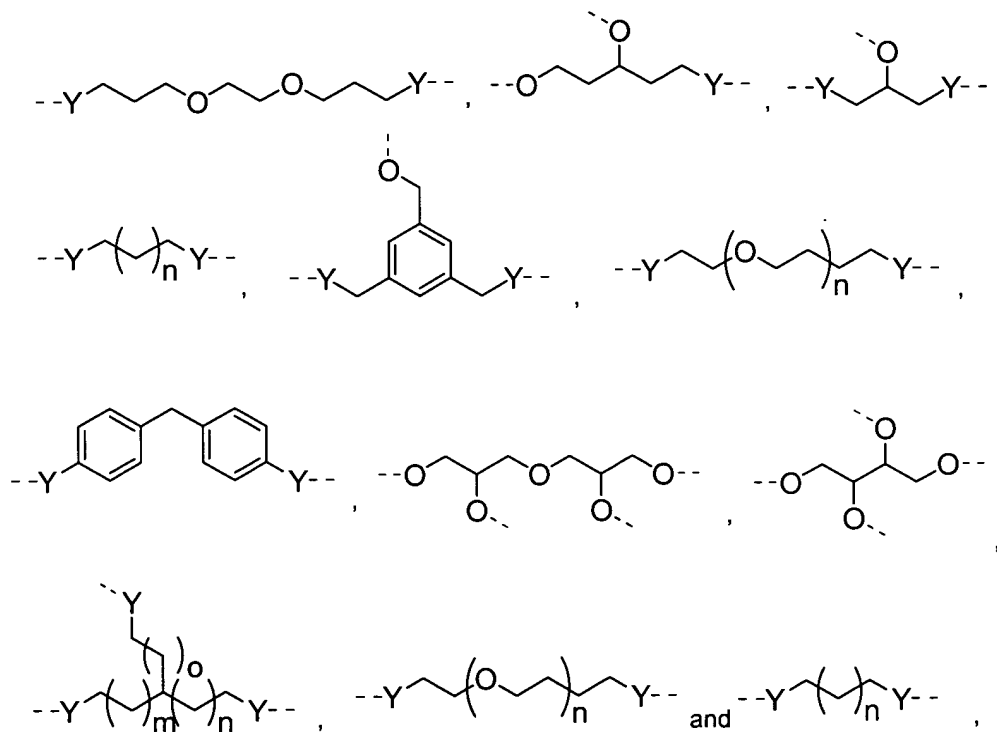
- 5 Y is selected from NH, O, NH(CO)O, NH(CS)O, NH(CO)NH, NH(CO), S-S-S-,  
Si(OR)<sub>3</sub> and SiR<sub>2</sub> wherein  
R is selected from alkyl, aryl, substituted alkyl or substituted aryl.

10. The method of claim 8 wherein said dienophile is selected from the group  
10 consisting of:



wherein

Z is a linker selected from the group consisting of:



15

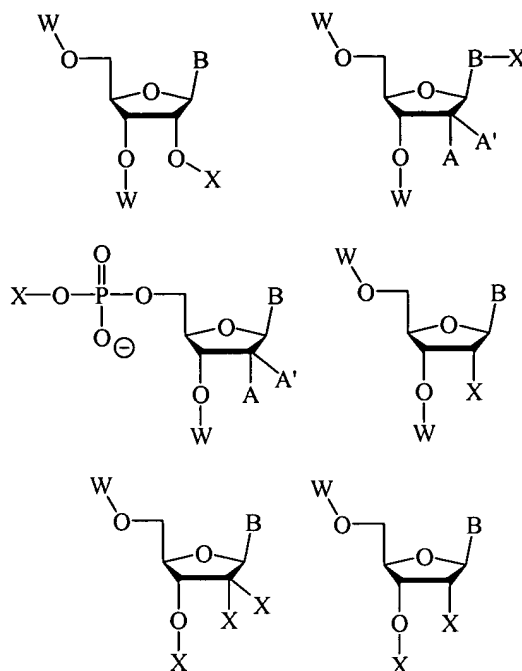
wherein

m, n, o are equal to 0, 1, 2 and

Y is selected from NH, O, NH(CO)O, NH(CS)O, NH(CO)NH, NH(CO), S-S-S-,  
Si(OR)<sub>3</sub> and SiR<sub>2</sub> wherein

- 20 R is selected from alkyl, aryl, substituted alkyl or substituted aryl.

11. The method of claim 1 wherein said derivatized molecule is an oligonucleotide selected from the group of compounds having the following formulas:



wherein

B is a nucleobase;

A and A' are 2'-sugar substituents;

W is independently selected from the group consisting of an oligonucleotide having between 1-1000 nucleobases, X or H; and

X is a diene, dienophile, 1,3-dipole, 1,3 dipolarophile, ene, enophile, alkene, alkyne or other moiety, capable of undergoing a cycloaddition reaction, additionally when X is attached to nucleobase B it can be attached to a carbon atom, an exocyclic nitrogen or an exocyclic oxygen.

12. The method of claim 11 wherein

A and A' are independently selected from the group consisting of H,  $^2\text{H}$ ,  $^3\text{H}$ , Cl, F, OH,  $\text{NHOR}^1$ ,  $\text{NHOR}^3$ ,  $\text{NHNHR}^3$ ,  $\text{NHR}^3$ ,  $=\text{NH}$ ,  $\text{CHCN}$ ,  $\text{CHCl}_2$ , SH,  $\text{SR}_3$ ,  $\text{CFH}_2$ ,  $\text{CF}_2\text{H}$ ,  $\text{CR}^2_2\text{Br}$ ,  $-(\text{OCH}_2\text{CH}_2)_n\text{OCH}_3$ ,  $\text{OR}^4$ , and imidazole;

$\text{R}^1$  is selected from the group consisting of H and an alcohol protecting group;

5             $R^2$  is selected from the group consisting of =O, =S, H, OH,  $CCl_3$ ,  $CF_3$ , halide, optionally substituted  $C_1$ - $C_{20}$  alkyl (including cyclic, straight chain, and branched),  $C_2$ - $C_{20}$  alkenyl,  $C_6$ - $C_{20}$  aryl,  $C_1$ - $C_{20}$  acyl,  $C_1$ - $C_{20}$  benzoyl,  $OR_4$  and esters;

$R^3$  is selected from the group consisting of  $R^2$ ,  $R^4$ , CN,  $C(O)NH_2$ ,  $C(S)NH_2$ ,  $C(O)CF_3$ ,  $SO_2R^4$ , amino acid, peptide and mixtures thereof;

10            $R^4$  is selected from the group consisting of an optionally substituted hydrocarbon ( $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl), an optionally substituted heterocycle, t-butyldimethylsilyl ether, triisopropylsilyl ether, nucleoside, carbohydrate, fluorescent label and phosphate; and

             X is selected from the group consisting of alkyl or substituted alkyl group bearing  
15 a conjugated diene unit, an alkoxy or substituted alkoxy group bearing a conjugated diene unit,  $CH_2CHCH=CHCH_2CH_2O$ , maleimide substituted alkoxy groups, dienophile substituted alkoxy groups, an alkylamino group or substituted alkylamino group bearing a conjugated diene unit, maleimide substituted alkylamino groups or substituted  
20 alkylamino groups, an alkylamino group or substituted alkylamino group bearing a dienophile moiety, a nitrile ylid, nitrile imine, nitrile oxide, diazoalkane, azide, azomethine ylid, azomethine imine, nitron, carbonyl ylid, carbonyl imine and carbonyl oxide.

13.        The method of claim 1 wherein said support is selected from the group  
25 consisting of glass, polymers and resins, and large biomolecules.

14.        The method of claim 13 wherein said glass is selected from the group consisting of controlled pore glass (CPG), glass slides, glass fibers, glass disks and materials coated with glass.

30           15.        The method of claim 13 wherein said polymers and resins are selected from the group consisting of polystyrene (PS), polyethylene glycol (PEG), copolymers of PS and PEG, copolymers of polyacrylamide and PEG and copolymers containing maleimide or maleic anhydride, polyvinyl alcohol and immunogenic high molecular  
35 weight compounds.

5

16. The method of claim 13 wherein said large biomolecules are selected from the group consisting of polysaccharides, proteins and nucleic acids.

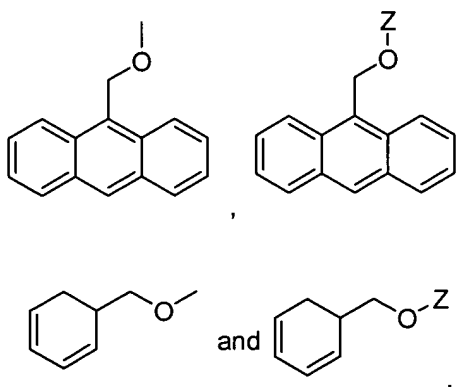
17. The method of claim 1 wherein said support is a solid support.

10

18. The method of claim 1 wherein said support is derivatized with a moiety selected from the group consisting of a diene or dienophile, with or without heteroatoms, a 1,3-dipole or 1,3-dipolarophile, with or without heteroatoms, an ene or enophile, with or without heteroatoms, a C2-C50 alkene, with or without heteroatoms, a C2-C50 alkyne, with or without heteroatoms, aromatic compounds, carbenes and carbene precursors.

15

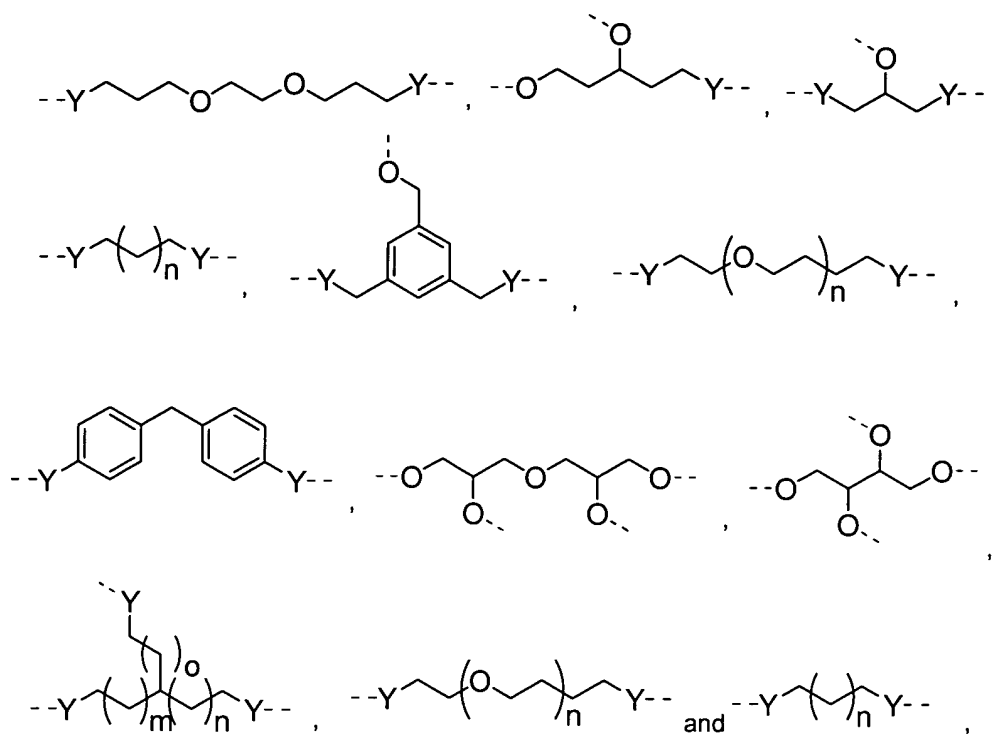
19. The method of claim 18 wherein said diene is selected from the group consisting of:



20

wherein

Z is a linker selected from the group consisting of:



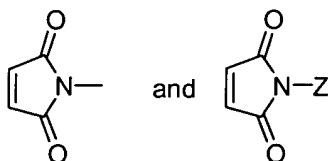
wherein

m, n, o are equal to 0, 1, 2 and

Y is selected from NH, O, NH(CO)O, NH(CS)O, NH(CO)NH, NH(CO), S-S-S-, Si(OR)<sub>3</sub> and SiR<sub>2</sub> wherein

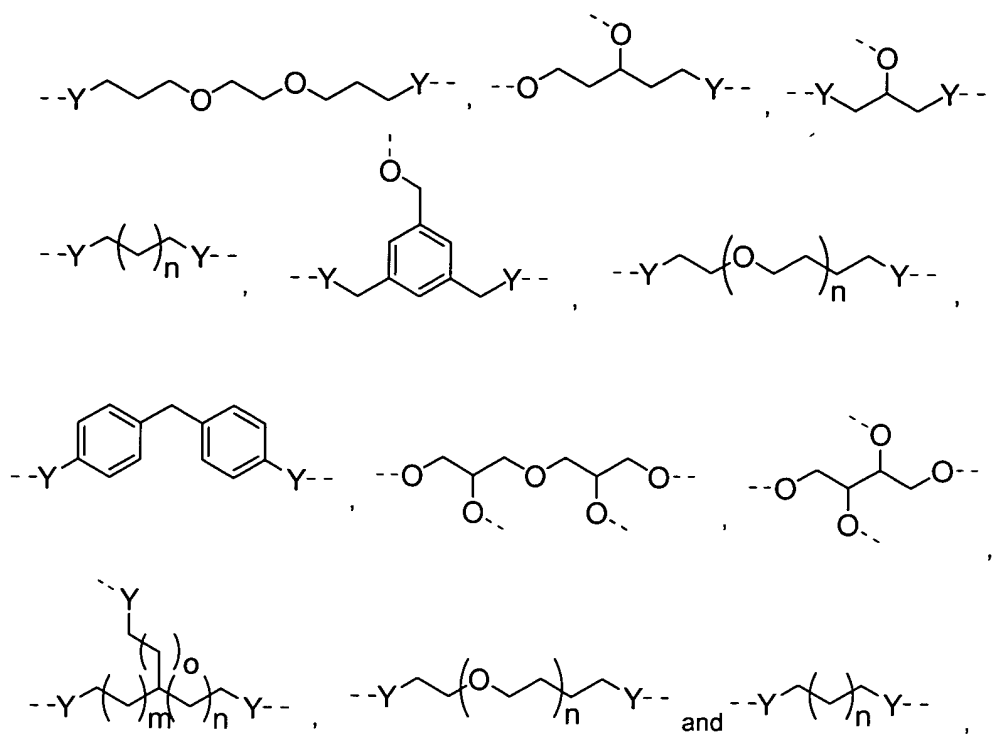
R is selected from alkyl, aryl, substituted alkyl or substituted aryl.

20. The method of claim 19 wherein said dienophile is selected from the group consisting of:



wherein

Z is a linker selected from the group consisting of:



wherein

m, n, o are equal to 0, 1, 2 and

Y is selected from NH, O, NH(CO)O, NH(CS)O, NH(CO)NH, NH(CO), S-S-S-,  
Si(OR)<sub>3</sub> and SiR<sub>2</sub> wherein

R is selected from alkyl, aryl, substituted alkyl or substituted aryl.

21. An immobilized product formed by the method of claim 1.

22. A compound selected from the group consisting of:

